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S-62 Experimental evolution in the context of ecosystems

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Level 2

Investigating the potential specialization of the pest Drosophila suzukii to different host fruits

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AIMS:

Theory predicts that adaptive trade-offs across environments promote the evolution of specialized genotypes. However, generalist genotypes that are not better adapted to a specific environment are often observed in nature. Generalists can be maintained despite trade-offs between environments under two circumstances: when environmental conditions are variable spatially or temporally or when there is no genetic variability to evolve toward specialized genotypes. Drosophila suzukii is an insect pest that attacks the fruits of a wide range of host plants. The availability of each type of host is restricted to a certain time of the year, which might prevent the evolution of specialist genotypes. We can hypothesize that if flies were able to develop on the same host for multiple generations, increased specialization should arise. We tested this hypothesis using an experimental evolution approach. We maintained replicate populations of flies in three different fruit environments. After five generations of experimental selection, each population evolved increased fitness on the fruit it was maintained on as well as on the two other fruits. In addition, preference tests showed that lines did not prefer their own fruit environment. These results indicate that the populations adapted to laboratory conditions, and that there was no response to potential trade-offs across environments. This suggests, that such trade-offs are weak or that there is no genetic variation for specialization to evolve. To confirm this finding, we are maintaining the experimental lines for another five additional generations. Our preliminary results highlight the difficulty of studying the evolution of specialization.